

PATENT ABSTRACTS OF JAPAN

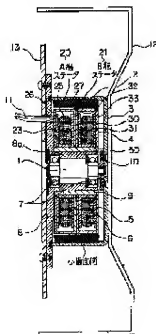
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(21)Application number : 10-110859 (71)Applicant : TAMAGAWA SEIKI CO LTD
(22)Date of filing : 21.04.199 (72)Inventor : KURATA MASASHI 8

(54) STEP MOTOR FOR SLOT MACHINE



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a step motor for a slot machine in which a stator constituted of A phase and B phase can be assembled without the need for adjustments, by shifting positions of guide protrusions of the respective insulating cap members which especially hold windings for A phase and B phase through a mechanical angle β as the step angle, and engaging the guide protrusions of the respective insulating cap member

with a trench of a stator fixing ring.

SOLUTION: In this step motor for a slot machine, in order

to shift the relative positions of the respective insulating cap members 23, 30 which hold an A phase stator 20 and a B phase stator 21 by a mechanical angle β , protruding positions (40, 41) of the respective insulating cap members 23, 30 are shifted by the mechanical angle β , and the respective protrusions (40, 41) are engaged with a trench 50 of a stator fixing ring 9. Thereby assembling is possible without using jigs.

CLAIMS

[Claim(s)]

[Claim 1] A step motor for slot machines which is provided with the following and with which, as for a relative position of said each projection (40, 41) or a slot comrade, only the mechanical angle β in which between said A phase stator (20) and B phase stators (21) makes a step angle is characterized by having shifted.

A cup type rotor (3) which is provided in a fixed case (8) via a bearing (7), enabling free rotation, and has a magnet (2).

A stator stop ring (9) provided in a cylinder part (8a) of said fixed case (8).

The 1st and 2nd insulation cap object which makes **** eclipse cyclic in a product along shaft orientations on a periphery of said stator stop ring (9) (23, 30).

The 1st and 2nd A phase magnetic pole plate (26, 27) which it is provided via a guide projection (28) formed in both sides of said 1st insulation cap object (23), and N magnetic pole (N) and S magnetic pole (S) counter mutually by turns, are arranged, and makes an A phase stator (20), The 1st and 2nd B phase magnetic pole plate (32, 33) which it is provided via a guide projection (28) formed in both sides of said 2nd insulation cap object (30), and N magnetic pole (N) and S magnetic pole (S) counter mutually by turns, are arranged, and makes a B phase stator (21), A slot (50) or a projection formed in a periphery of said stator stop ring (9), the 1st and 2nd projection (40, 41) formed in an inner hole (22, 35) of each of said insulation cap object (23, 30), or a slot.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]In this invention, only the mechanical angle β which is a step angle can shift the position of the guide projection of each insulation cap object which holds the winding for an A phase and for B phases especially about the step motor for slot machines. Therefore, it is related with the new improvement for assembling the stator which consists of an A phase and a B phase, without requiring any adjustment by making the guide projection of each insulation cap fit into the slot of a stator stop ring.

[0002]

[Description of the Prior Art]In this kind used conventionally of step motor for slot machines, When assembling the A phase stator and B phase stator which have winding of an A phase and a B phase, after an assembly, a tool is used, and he performs phase ***** of an A phase stator and a B phase stator, and was trying to acquire the mechanical angle β which is a step angle.

[0003]

[Problem(s) to be Solved by the Invention]Since the conventional step motor for slot machines was constituted as mentioned above, the following technical problems existed. That is, since angular-position adjustment was carried out with the tool in order to set up the mechanical angle β between an A phase stator and a B phase stator, the tuning was difficult, and had to fix each insulation cap object to the stator stop ring with adhesives after adjustment, and variation had occurred in product precision.

[0004]When it was made in order that this invention might solve the above technical problems, and only the mechanical

angle beta which is a step angle can shift the position of the guide projection of each insulation cap object which holds the winding for an A phase and for B phases especially, It aims at providing the step motor for slot machines which enabled it to assemble the stator which consists of an A phase and a B phase without requiring any adjustment by making the guide projection of each insulation cap object fit into the slot of a stator stop ring.

[0005]

[Means for Solving the Problem]A step motor for slot machines by this invention, A cup type rotor which is provided in a fixed case via a bearing, enabling free rotation, and has a magnet, A stator stop ring provided in a cylinder part of said fixed case, and the 1st and 2nd insulation cap object which is accumulated and provided in a periphery of said stator stop ring along shaft orientations, and makes cyclic, The 1st and 2nd A phase magnetic pole plate which it is provided via a guide projection formed in both sides of said 1st insulation cap object, and N magnetic pole and S magnetic pole counter mutually by turns, are arranged, and makes an A phase stator, The 1st and 2nd B phase magnetic pole plate which it is provided via a guide projection formed in both sides of said 2nd insulation cap object, and N magnetic pole and S magnetic pole counter mutually by turns, are arranged, and makes a B phase stator, Having a slot or a projection formed in a periphery of said stator stop ring, and the 1st and 2nd projection or a slot formed in an inner hole of each of said insulation cap object, a relative position of said each projection or a slot comrade is the composition that only the mechanical angle beta in which between said A phase stator and B phase stators makes a step angle has shifted.

[0006]

[Embodiment of the Invention]Hereafter, the suitable

embodiment of the step motor for slot machines by this invention is described with a drawing. What is shown with the numerals 8 in drawing 1 is the fixed case fixed to the motor standing ways 13, The axis of rotation 1 is formed in this fixed case 8 via the bearing 7, enabling free rotation, and the cup type rotor 3 which has the magnet 2 is formed in this axis of rotation 1, and the pattern reel 12 for slot machines is attached to this cup type rotor 3.

[0007]The stator stop ring 9 is formed in the periphery of the cylinder part 8a of said fixed case 8, and A phase stator 20 and B phase stator 21 are laminated by the periphery of this stator stop ring 9 along shaft orientations. The A phase stator winding 25 which sectional shape made about H type as this A phase stator 20 was shown in drawing 2 - drawing 6, and was formed in the coil attaching part 24 of the cyclic 1st insulation cap object 23 which has the inner hole 22, It is formed in the 1st and 2nd A phase magnetic pole plates 26 and 27 formed in the both sides of this 1st insulation cap object 23, and these A phase each magnetic pole plates 26 and 27, and comprises the N magnetic pole N and the S magnetic pole S which countered mutually and have been arranged.

[0008]As drawing 5 shows these A phase each magnetic pole plates 26 and 27 from drawing 3 so that N and S may become alternation, the guide projections 28 and 29 are formed in the pitch of the mechanical angle α , and each magnetic poles N and S are positioned considering each guide projections 28 and 29 as a guide. each magnetic poles N and S serve as alternation like drawing 2 -- as -- the 1st insulation cap object 23 -- the 1st page of the pitch [the 2nd page of] of each guide projections 28 and 29 of 23b shifts from 23a $\alpha/2$ mutually, and it is formed.

[0009]The 2nd insulation cap object 30 which was formed identically to drawing 4 like the above-mentioned as for said B phase stator 21, It consists of the B phase stator winding 31 and the 1st and 2nd B phase magnetic pole plates

32 and 33 formed in the both sides of this 2nd insulation cap object 30, Since the B phase each magnetic pole plates 32 and 33 are positioned so that it may shift to the 2nd insulation cap object 30 $\alpha/2$ mutually like the above-mentioned A phase each magnetic pole plates 26 and 27, other explanation is omitted here.

[0010]In the inner holes 22 and 35 of each of said insulation cap objects 23 and 30. When each projections 40 and 41 fit into the slot 50 which the 1st and 2nd projection 40 and 41 was formed and was formed in the periphery of said stator stop ring 9, each insulation cap objects 23 and 30 are laminated by shaft orientations in the state with each stators 20 and 21. In this case, since only the mechanical angle β in which each stators 20 and 21 are step angles mutually can shift a phase, Only the part has shifted to the hand of cut to the groove center 50A of the slot 50 to the 1st projection 40 like drawing 6 in the formation position of the 2nd projection 41, By fitting in each projections 40 and 41 by considering the slot 50 as a guide, each stators 20 and 21 are laminated on the stator stop ring 9, after only the mechanical angle β has shifted automatically.

[0011]Each above-mentioned projections 40 and 41 can be used as a slot, and the slot 50 can also be considered as a projection.

[0012]

[Effect of the Invention]The step motor for slot machines by this invention, Since it is constituted as mentioned above, the projection or slot in which only the mechanical angle β of each other was formed by shifting in the stator of an A phase, and the stator of the B phase only by making it fit into the slot of a stator stop ring, or a projection. Without performing post-adjustment, only the mechanical angle β shifts, can be attached and can raise the abbreviation of the number of assemblers, and the

accuracy after an assembly.

TECHNICAL FIELD

[Field of the Invention]In this invention, only the mechanical angle β which is a step angle can shift the position of the guide projection of each insulation cap object which holds the winding for an A phase and for B phases especially about the step motor for slot machines. Therefore, it is related with the new improvement for assembling the stator which consists of an A phase and a B phase, without requiring any adjustment by making the guide projection of each insulation cap fit into the slot of a stator stop ring.

PRIOR ART

[Description of the Prior Art] In this kind used conventionally of step motor for slot machines, When assembling the A phase stator and B phase stator which have winding of an A phase and a B phase, after an assembly, a tool is used, and he performs phase ***** of an A phase stator and a B phase stator, and was trying to acquire the mechanical angle β which is a step angle.

EFFECT OF THE INVENTION

[Effect of the Invention]The step motor for slot machines by this invention, Since it is constituted as mentioned above, the projection or slot in which only the mechanical angle beta of each other was formed by shifting in the stator of an A phase, and the stator of the B phase only by making it fit into the slot of a stator stop ring, or a projection. Without performing post-adjustment, only the mechanical angle beta shifts, can be attached and can raise the abbreviation of the number of assemblers, and the accuracy after an assembly.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since the conventional step motor for slot machines was constituted as mentioned above, the following technical problems existed. That is, since angular-position adjustment was carried out with the tool in order to set up the mechanical angle β between an A phase stator and a B phase stator, the tuning was difficult, and had to fix each insulation cap object to the stator stop ring with adhesives after adjustment, and variation had occurred in product precision.

[0004] When it was made in order that this invention might solve the above technical problems, and only the mechanical angle β which is a step angle can shift the position of the guide projection of each insulation cap object which holds the winding for an A phase and for B phases especially, It aims at providing the step motor for slot machines which enabled it to assemble the stator which consists of an A phase and a B phase without requiring any adjustment by making the guide projection of each insulation cap object fit into the slot of a stator stop ring.

MEANS

[Means for Solving the Problem]A step motor for slot machines by this invention, A cup type rotor which is provided in a fixed case via a bearing, enabling free rotation, and has a magnet, A stator stop ring provided in a cylinder part of said fixed case, and the 1st and 2nd insulation cap object which is accumulated and provided in a periphery of said stator stop ring along shaft orientations, and makes cyclic, The 1st and 2nd A phase magnetic pole plate which it is provided via a guide projection formed in both sides of said 1st insulation cap object, and N magnetic pole and S magnetic pole counter mutually by turns, are arranged, and makes an A phase stator, The 1st and 2nd B phase magnetic pole plate which it is provided via a guide projection formed in both sides of said 2nd insulation cap object, and N magnetic pole and S magnetic pole counter mutually by turns, are arranged, and makes a B phase stator, Having a slot or a projection formed in a periphery of said stator stop ring, and the 1st and 2nd projection or a slot formed in an inner hole of each of said insulation cap object, a relative position of said each projection or a slot comrade is the composition that only the mechanical angle beta in which between said A phase stator and B phase stators makes a step angle has shifted.

[0006]

[Embodiment of the Invention]Hereafter, the suitable embodiment of the step motor for slot machines by this invention is described with a drawing. What is shown with the numerals 8 in drawing 1 is the fixed case fixed to the motor standing ways 13, The axis of rotation 1 is formed in this fixed case 8 via the bearing 7, enabling free rotation, and the cup type rotor 3 which has the magnet 2 is formed

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[0007]The stator stop ring 9 is formed in the periphery of the cylinder part 8a of said fixed case 8, and A phase stator 20 and B phase stator 21 are laminated by the periphery of this stator stop ring 9 along shaft orientations. The A phase stator winding 25 which sectional shape made about H type as this A phase stator 20 was shown in drawing 2 - drawing 6, and was formed in the coil attaching part 24 of the cyclic 1st insulation cap object 23 which has the inner hole 22, It is formed in the 1st and 2nd A phase magnetic pole plates 26 and 27 formed in the both sides of this 1st insulation cap object 23, and these A phase each magnetic pole plates 26 and 27, and comprises the N magnetic pole N and the S magnetic pole S which counteracted mutually and have been arranged.

[0008]As drawing 5 shows these A phase each magnetic pole plates 26 and 27 from drawing 3 so that N and S may become alternation, the guide projections 28 and 29 are formed in the pitch of the mechanical angle α , and each magnetic poles N and S are positioned considering each guide projections 28 and 29 as a guide. each magnetic poles N and S serve as alternation like drawing 2 -- as -- the 1st insulation cap object 23 -- the 1st page of the pitch [the 2nd page of] of each guide projections 28 and 29 of 23b shifts from 23a $\alpha/2$ mutually, and it is formed.

[0009]The 2nd insulation cap object 30 which was formed identically to drawing 4 like the above-mentioned as for said B phase stator 21, It consists of the B phase stator winding 31 and the 1st and 2nd B phase magnetic pole plates 32 and 33 formed in the both sides of this 2nd insulation cap object 30, Since the B phase each magnetic pole plates 32 and 33 are positioned so that it may shift to the 2nd insulation cap object 30 $\alpha/2$ mutually like the above-mentioned A phase each magnetic pole plates 26 and 27, other explanation is omitted here.

[0010]In the inner holes 22 and 35 of each of said insulation cap objects 23 and 30. When each projections 40 and 41 fit into the slot 50 which the 1st and 2nd projection 40 and 41 was formed and was formed in the periphery of said stator stop ring 9, each insulation cap objects 23 and 30 are laminated by shaft orientations in the state with each stators 20 and 21. In this case, since only the mechanical angle β in which each stators 20 and 21 are step angles mutually can shift a phase, Only the part has shifted to the hand of cut to the groove center 50A of the slot 50 to the 1st projection 40 like drawing 6 in the formation position of the 2nd projection 41, By fitting in each projections 40 and 41 by considering the slot 50 as a guide, each stators 20 and 21 are laminated on the stator stop ring 9, after only the mechanical angle β has shifted automatically.

[0011]Each above-mentioned projections 40 and 41 can be used as a slot, and the slot 50 can also be considered as a projection.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a sectional view showing the step motor for slot machines by this invention.

[Drawing 2] It is a part plan showing each stator of drawing 1.

[Drawing 3] It is a side view showing the 1st page of drawing 4.

[Drawing 4] It is a sectional view showing the insulation cap object of drawing 1.

[Drawing 5] It is a side view showing the 2nd page of drawing 4.

[Drawing 6] Each projection of one pair of insulation cap objects is an explanatory view showing the state where only the mechanical angle β has shifted.

[Description of Notations]

2 Magnet

3 Cup type rotor

7 Bearing

8 Fixed case

8a Cylinder part

9 Stator stop ring

20 A phase stator

21 B phase stator

23 and 30 The 1st and 2nd insulation cap object

26 and 27 The 1st and 2nd A phase magnetic pole plate

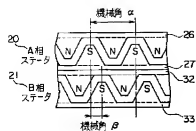
28 Guide projection

22 and 25 Inner hole

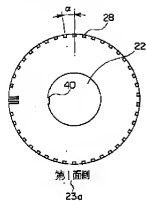
32 and 33 The 1st and 2nd B phase magnetic pole plate

DRAWINGS

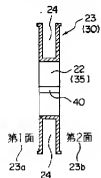
[Drawing 2]



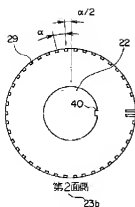
[Drawing 3]



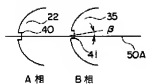
[Drawing 4]



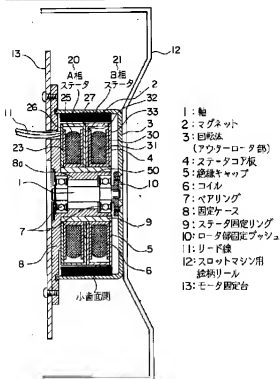
[Drawing 5]



[Drawing 6]



[Drawing 1]



- 1 : 軸
- 2 : マグネット
- 3 : 回転板
(アウターロータ部)
- 4 : ステータコイル板
- 5 : 絶縁キャップ
- 6 : コイル
- 7 : ベアリング
- 8 : 固定ケース
- 9 : ステータ固定リング
- 10 : ロータ固定バネ
- 11 : リード線
- 12 : スロットマシン用
送紙リール
- 13 : モータ固定台